## REMARKS

In response to the Office Action mailed June 8, 2009, Applicant respectfully requests reconsideration. Claims 27-34 remain pending for examination with claim 27 being the sole independent claim. No new matter has been added.

Preliminarily, Applicant respectfully requests that the amendment to claim 31 be entered because the amendment was made to provide proper antecedent basis for the terms in the claim, rather than being made in response to any of the rejections in the Office Action.

Rejections Under 35 U.S.C. §103

The Office Action rejects claims 27-34 under 35 U.S.C. §103(a) as allegedly being obvious over Non-Patent Publication "Assembly of a Zn(II)-Porphyrin-Bipyridinium Dyad and Au-Nanoparticles Superstructures on Conductive Surfaces" (hereinafter, "Lahav"). Applicant respectfully traverses each of these rejections.

Claim 27 comprises a "dendrimer structure." Claims 28-34 depend from claim 27 and also comprise dendrimer structures. Applicant respectfully reasserts that Lahav does not teach or suggest dendrimers of any kind, does not teach or suggest all of the limitations of claim 27, and thereby fails to render obvious the claimed invention.

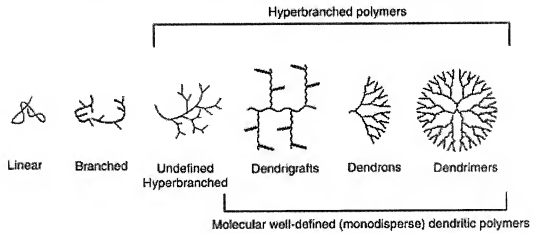
The Office Action asserts that Applicant's specification ***defines*** "a dendrimer porphyrin structure having a porphyrin core (center portion) and including an ionic functional group on an outer surface of the dendronic site" (Office Action, page 6, emphasis added). However, the above-quoted portion of Applicant's specification does not define a dendrimer, but rather describes several features of a non-limiting embodiment of a dendrimer porphyrin structure, as evidenced by the words "For example," which precede the above-quoted section in the Applicant's specification.

*Definition of a Dendrimer*

The Examiner appears to assert that the di-substituted proto-porphyrin molecule of Lahav is a dendrimer. However, Applicant respectfully disagrees with this assertion based upon textbook definitions of dendrimers which are readily available to those of

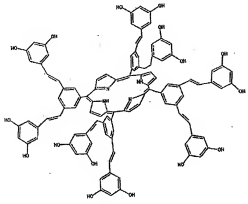
skill in the art. For example, Amiji has defined several of the features which are common to dendrimers: "Dendrimers are highly branched and have three distinct structural features: a core, multiple peripheral (end-) groups, and branching units that link the two." ( Please see Mansoor M. Amiji *Nanotechnology for Cancer Therapy* **2007**, CRC Press, p 529, attached.) These three distinct structural features of dendrimers are illustrated below. (Please see U. Boas, Jørn Bolstad Christensen, and P. M. H. Heegaard, *Dendrimers in Medicine and Biotechnology* **2006,** RSC Publishing, page 3, attached.) The "dendrimers" structure of Boas *et al.* comprises the three distinct structural features of Amiji: a *(trisubstituted)* core, *(forty-eight)* multiple end groups, and *(four generations of)* branching units that link the two (the *trisubstituted* core and the *forty-eight* end units).

**from Boas *et al.* – An illustration of dendrimers and several non-dendrimers.**

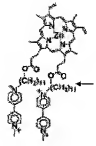



The dendrimer structure recited in claim 27, a non-limiting example of which is shown in Figure 3 of Applicant's specification, also comprises the three distinct structural features of a dendrimer as defined in Amiji. For example, the dendrimer illustrated in Figure 3 has a (*porphyrin*) core, multiple (*dihydroxy phenyl*) end groups, and (*trisubstituted phenyl*) branching units that link the two (the *porphyrin* and *dihydroxy phenyl groups).*

**A dendrimer of Figure 3**



**The di-substituted proto-porphyrin of Lahav**



In contrast, none of the molecules of Lahav, including the di-substituted proto-porphyrin referred to in the Office Action (shown above), is a dendrimer. Furthermore, Lahav fails to refer to any of the structures recited therein, including the di-substituted proto-porphyrin, as a "dendrimer". Although the di-substituted proto-porphyrin may have a porphyrin core and/or multiple end groups, the di-substituted proto-porphyrin of Lahva lacks *branching units that link the two*. That is, the substituents attached to the porphyrin core of Lahav are not branched. Thus, Applicant respectfully asserts that the di-substituted proto-porphyrin of Lahav is not a dendrimer.

As should be appreciated from the foregoing, claim 27 patentably distinguishes over Lahav at least because Lahav does not teach or suggest all of the limitations of claim 27. Claims 28-34 depend from claim 27 and are patentable for at least the same reasons. Accordingly, it is respectfully requested that each of the claim rejections under 35 U.S.C. §103 be withdrawn.

## CONCLUSION

A Notice of Allowance is respectfully requested. The Examiner is requested to call the undersigned at the telephone number listed below if this communication does not place the case in condition for allowance.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicants hereby request any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, the Director is hereby authorized to charge any deficiency or credit any overpayment in the fees filed, asserted to be filed, or which should have been filed herewith to our Deposit Account No. 23/2825 under Docket No. S1459.70066US00.

Dated: August 7, 2009

Respectfully submitted,

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Nanotechnology for cancer therapy By Mansoor M. Amiji

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targeting ligands.

## 27.5 DENDRIMER AS DRUG DELIVERY SYSTEM: SELECTION, APPLICABILITY, AND RATIONALITY

Dendrimers are a relatively new class of polymers with structures that depart rather dramatically from traditional linear polymers that are built from ω-ended AB monomers (Newkome, Moorefield, and Vogtle 1996). Because they are built from $AB_n$ monomers (where $n$ is usually 2 or 3), dendrimers are highly branched and have three distinct structural features: a core, multiple peripheral (end-) groups, and branching units that link the two. The peripheral groups and branching units are together called dendrons, or informally, wedges. Branching units used to date have contained virtually every type of functional group, ranging from those comprising pure hydrocarbons or aromatic groups to modified carbohydrates and nucleic acids. Dendrimers are iteratively synthesized so that the number of intervening branching units between the core and one end-group (i.e., the number of layers), called the generation number, is determined by the number of synthetic cycles. In the commercially available polyamidoamine) (PAMAM) dendrimers, ammonia represents the zeroth generation (Tomalia, Naylor, and Goddard 1990). As the generation number increases from one to seven, the number of peripheral groups follows the geometric series 3, 6,

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12.....192. These peripheral groups largely control the solubility of the compound so that even with highly hydrophobic internal units, a dendrimer will dissolve in water if the end groups are sufficiently hydrophilic. As will be discussed here, this feature and the high local concentration of end groups enable a number of applications in bio-organic chemistry. Dendrimers represent a new class of highly branched polymers whose interior cavities and multiple peripheral groups facilitate potential applications in biomedicine and bio-organic chemistry (Kim and Zimmerman 1998). Major advances in the past years were made in the synthesis and study of new carbohydrate,

Dendrimers in medicine and biotechnology By U. Boas, Jørn Bolstad Christensen, P. M. H. Heegaard

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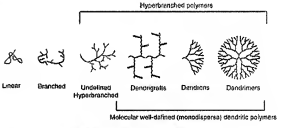


**Figure 1.3** *Evolution of polymers towards dendritic structures*

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of polymers are not suitable to study chemical phenomena, which generally require a well-defined chemical motif enabling the scientist to analyse the chemical events taking place. The physicochemical properties of the undefined hyperbranched polymers are intermediate between dendrimers and linear polymers.[3]

*Dendrigrafts* are class of dendritic polymers like dendrimers that can be constructed with a well-defined molecular structure, *i.e.* being monodisperse. However,